

ANNUAL REPORT

OF

THE KEEPER

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

AT HARVARD COLLEGE,

TO THE

PRESIDENT AND FELLOWS OF HARVARD COLLEGE

FOR

1903-1904.

CAMBRIDGE, U. S. A.:

UNIVERSITY PRESS: JOHN WILSON AND SON

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CAMBRIDGE, MASS.

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PHILIP S. SMITH *Instructor in Geology.*

LEON J. COLE *Austin Teaching Fellow in Zoölogy.*

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REPORT.

TO THE PRESIDENT AND FELLOWS OF HARVARD COLLEGE:—

The following is a synopsis of the instruction given during the past academic year in the laboratories of Zoölogy, Geology, and Geography of the Zoölogical and Geological Sections of the University Museum.

Eleven courses in Zoölogy were given by Professors Mark, Jackson, Parker, Castle, and Drs. Rand and Petrunkevitch, assisted by Messrs. Cole, Larrabee, Smith, and four Sub-Assistants. Three hundred and six students attended these courses, while four courses in Zoölogy were attended by thirty-four students of Radcliffe College.

In the Departments of Geology and Geography eighteen courses were given to five hundred and twenty-four students, and five courses to seventy-four students of Radcliffe. These courses were given by Professors Shaler, Davis, Jackson, Ward, Jaggar, J. B. Woodworth, and Mr. Smith, assisted by Messrs. Bell, Goldthwait, Gregory, Richards, Tower, and Wood.

In the summer school under the direction of Professor J. E. Woodman of Dalhousie College, Halifax, two courses in Geology and one course in Physiography were offered. Professor Woodman was assisted by Messrs. H. T. Burr and F. M. Wilder. The courses were attended by 39 students.

Influenced by the establishment of additional marine biological stations for research in Atlantic waters, the Faculty of the Museum petitioned the Council of the Boston Society of Natural History to so alter the deed of gift to the trustees of the Museum that the income of the Humboldt Fund could be extended for the

use of students pursuing investigations at the new stations in Bermuda and at the Tortugas (see [C], page 35).

The various reports of the assistants in charge of the collections announce a gratifying list of accessions to the stores of the Museum. All departments of the Museum already feel the influence of the expedition by which, through the generosity of Mr. John E. Thayer, our collections are being enriched. The significance of Mr. Thayer's expedition is of especial value. A student of nature himself, he is the son of Nathaniel Thayer, who in 1865, in the early infancy of the Museum, supplied its distinguished founder with all the means for the famous expedition to Brazil, the fruits of which are the basis of the immense storage collections now at Cambridge.

Among the larger accessions for the year is the extensive Flood collection, chiefly birds, received through Mr. J. E. Thayer (see Mr. Brewster's report), and the donation by Professor H. P. Johnson, who was formerly a student at the Museum, of his large and valuable collection of marine annelids, mostly from the Pacific Coast. Professor Johnson's gift is of especial value as it contains his many types and figured specimens.

Much has been done toward developing the new palæontological exhibits. Upwards of one hundred and fifty fossil vertebrates have been mounted by Mr. Nelson and placed on exhibition. To the reptilian fauna of the North American Room and elsewhere, Mr. Nelson has added some twenty of his excellent preparations of recent forms, including a large Anaconda.

The Museum was fortunate in securing for a part of the summer the services of Miss E. Wood of the United States Geological Survey. With the help of Dr. Jackson she selected a large amount of material for the Palæozoic Room, and it is hoped now that this room will soon be accessible to the public. A new case has been installed in connection with the exhibit illustrating methods in Thalassography, and with the new instruments and apparatus expected, the exhibit promises to be one of peculiar interest.

The additions to the Library, as reported by Mr. Henshaw, are 5,588 volumes, parts of volumes, pamphlets, and maps, making the

total number of volumes upward of forty thousand and pamphlets upward of thirty-three thousand.

The publications of the past year include thirteen numbers of the "Bulletin," with 921 pages and 191 plates, and two numbers of the "Memoirs," with 357 pages and 108 plates. Of the two "Memoirs," one is the Report on the Sponges of Mr. Agassiz's "Albatross" expedition of 1891, by E. V. Wilson (No. XXV.); the other, Mr. Agassiz's final Report on the Coral Reefs of the Maldiv Islands. Five numbers of the "Bulletin" are reports on the collections of the different expeditions of Mr. Agassiz, and four numbers are contributions from the Zoölogical Laboratory. Volumes XLII., XLIII., XLVI., XLVII., and XLVIII. of the "Bulletin," and Volumes XXV., XXVI., XXVII., XXX., XXXII., and XXXIII. of the "Memoirs" are now in course of publication.

W. McM. WOODWORTH.

Keeper of the Museum.

REPORT ON THE ZOÖLOGICAL LABORATORY.

BY PROFESSOR E. L. MARK.

THE number of students from each of the several classes and departments of the University attending the courses in Zoölogy during the academic 1903-04 is shown in the following table, the numbers printed in italics indicating students from the Lawrence Scientific School: —

Courses. 1903-04.	Grad.	Sen.	Jun.	Soph.	Fresh.	Spec.	Bussey.	Total.
Zoölogy 1	3	7+2	15+8	42+10	35+10	5+13	1	108+43=151
" 2		4	9+3	19+5	2+2	1+1		35+11=46
" 3	3	5+2	9+6	1+2	1	2		19+12=31
" 4	3	1+2	1+2	1		1		5+6=11
" 5	4	2+3	2+2	1		1		8+7=15
" 9	3	1		1				4+1=5
" 9 ^a		1		1+2				2+2=4
" 11	4	1+1		1		1		6+2=8
" 13	5	1	1	1		1		5+4=9
" 15	8	1	1	2		1		8+5=13
" 20	10	1		1		1		10+3=13
Sums	43	22+13	36+23	64+26	38+12	6+22	1	210+96=306

The following table shows the number of students of Radcliffe College who took courses in Zoölogy —

Courses. 1903-04.	Sen.	Jun.	Soph.	Fresh.	Spec.	Total.
Zoölogy 1	6	4	10	5	3	28
" 2			2			2
" 4	1	1				2
" 5	1	1				2
Sums	8	6	12	5	3	34

At the beginning of the year Dr. Alexander Petrunkevitch was approved as Docent in Zoölogy to give, in the second half-year, a course in Cytology. No fundamental changes have been made

in any of the courses of instruction as compared with the preceding year. Minor changes are noted in connection with the accounts of the several courses.

In Zoölogy 1, given by Professor Parker, the lectures on Evolutionary Zoölogy were rewritten and illustrated by living guinea-pigs and rabbits belonging to the laboratory, and reared by Professor Castle. The work of students in the laboratory has been facilitated by improved accommodations for storing separately the material and notes of each student, and a case has been built and placed in the lecture room for such illustrative material as is most used in this course. By this means the janitor will be spared much time hitherto employed in transporting specimens from the fourth to the first floor and back again.

The Chief Assistant in this course in Harvard College was Mr. Grant Smith; the Sub-Assistants, Messrs. I. A. Field, A. D. Howard, and S. O. Mast. The Assistant in Radcliffe College was Mr. J. A. Long.

The number of lectures in Zoölogy 2, given by Professor Castle, was slightly increased (to thirty-six). To the animals studied in the laboratory was added *Amphioxus*, the time for this being taken from the time heretofore given to the study of the frog. The Chief Assistant in the course was Mr. L. J. Cole, Austin Teaching Fellow, whose place was taken during his absence for a considerable part of the second half-year in Yucatan, by Mr. J. H. McClellan. The Sub-Assistants were Messrs. D. W. Davis and I. A. Field.

Dr. Rand conducted, as previously, Zoölogy 3. The lectures were substantially as in the preceding year, but in the interest of students wishing to take, in the second half-year, work in Neurology (Zoölogy 15) the lectures on the nervous system were transferred from the second to the first half-year. Mr. A. P. Larrabee was Assistant in the laboratory work. One student, Mr. J. L. Ulrich, undertook, jointly with the instructor, the study of a special problem in anatomy, the results of which will be later offered for publication. Some progress has been made in increasing both the demonstration material and that designed for use by students in their laboratory exercises. Dr. Rand believes that the course might be considerably improved by a plan which would diminish slightly the number of lectures, and increase the number of conferences, so that the correlation between laboratory exercises and lectures could be made more evident and instructive.

As for several years past, the laboratory work in Zoölogy 4, in both Harvard and Radcliffe, was under the immediate charge of Dr. Rand, who also gave five lectures on the anatomy and histology of the Hirudinea. The remaining lectures given by Professor Mark covered about the same ground as in the previous year, and the material studied in the laboratory was Glossiphonia.

In Zoölogy 5 the lectures, by Professor Mark, dealt chiefly with selected problems, and were supplemental to the reading required on the general outlines of Vertebrate Embryology. In the laboratory less time than heretofore was given to the technical part of the work, and more to the study of chick embryos and preparations made from them. Dr. Rand had charge of the laboratory work both in Harvard University and Radcliffe College.

Professor Jackson's courses in Palæontology (Zoölogy 9 and 9 a) were larger than in the preceding year. Considerable addition was made to the teaching material, chiefly from collections made at the Bermuda Biological Station in the summer of 1903, by Messrs. T. Barbour, O. Bryant, and F. W. Carpenter.

The lectures in Zoölogy 11, by Professor Castle, were largely rewritten, and their preparation occupied a considerable portion of the instructor's time. Each of the eight students to whom was assigned a topic for special study made satisfactory progress, either in the accumulation of data, or otherwise, and the results of their work will ultimately be incorporated in reports on the various topics.

The lectures and the laboratory work in Zoölogy 13 were modified by reducing the amount of time given to nervous tissues, and adding a consideration of cartilage and cuticula. The course was thus made to include a study of representatives of all four classes of tissues; it was given, as previously, by Professor Parker.

Zoölogy 15 was also given by Professor Parker, as usual. The lectures were largely revised. The laboratory topics were in two cases identical with those pursued in Zoölogy 20. The results from studies on five of the eleven remaining topics will be presented for publication later.

There were enrolled in the course on Cytology, by Dr. Petrunkévitch, 9 students. Two lectures a week were given during the second half-year, illustrated by an extensive series of microscopic preparations and followed by informal discussions. There were no examinations, and the course did not count toward the attain-

ment of any degree. Some of the topics treated of were: The structure of protoplasm with relation to its chemical and physical qualities; The structure of the nucleus and the mechanism of cell-division; The *de novo* formation of centrosomes and the hypothesis of their individuality; The reduction division in ovogenesis and spermatogenesis, with special reference to the formation of tetrads; The meaning of fertilization and of parthenogenesis, both natural and artificial.

Researches (Zoölogy 20) were carried on during the year by thirteen students. Of these two were under the supervision of Professor Castle, three under Professor Parker, and eight under Professor Mark. As in the preceding year, additional time for research work was in a few cases gained by allowing the student to meet the laboratory requirements in some of the formal courses (11 and 15) by devoting his laboratory time in those courses to the topic of his research. Of the two students working under the guidance of Professor Castle, one — Mr. G. M. Allen — has presented the results of his studies in the form of a thesis for the Ph.D. degree. The studies of the other have resulted in showing that the alternative conditions of the optic chiasma in certain bony fishes are not hereditary. Satisfactory progress has been made by those carrying on their work under the supervision of Professors Parker and Mark. Messrs. F. W. Carpenter, Grant Smith, and Porter E. Sargent have presented the results of their work as theses for the doctor's degree, and the theses have been approved by special committees appointed to examine and report upon them.

In June, 1904, the degree of Doctor of Philosophy was conferred on three candidates in Zoölogy: Mr. Glover Morrill Allen, whose thesis was on "The Heredity of Coat Color in Mice;" Mr. Frederic Walton Carpenter, whose thesis was on "The Development of the Oculomotor Nerve, the Ciliary Ganglion, and the Abducent Nerve in the Chick;" and Mr. Grant Smith, whose thesis was entitled "On the Eyes of Certain Pulmonate Gastropods, with Special Reference to the Neurofibrillæ in *Limax maximus*."

Professor Parker has conducted experiments on the lateral-line organs of fishes for the United States Fisheries Bureau, and, in conjunction with Miss Adele M. Fielde, on reactions of ants to material vibrations. He has also delivered a number of public lectures at the Brooklyn Institute of Arts and Sciences and else-

where, on human sense organs; has written a number of reviews for the "American Naturalist," and has had considerable editorial work to do.

Professor Castle is continuing his experimental study of heredity in guinea-pigs and rabbits, and breeding experiments with insects. He has published during the year "Contributions," No. 146, and has republished "Contributions," No. 136, with some additions and alterations, in *Science*, n. s., Vol. 18, No. 456, pp. 396-406, Sept. 25, 1903. Other publications not in the "Contributions" are: "The Heredity of 'Angora' Coat in Mammals." *Science*, n. s., Vol. 18, No. 467, pp. 760-761, Dec. 11, 1903; and "Sex Determination in Bees and Ants." *Science*, n. s., Vol. 19, No. 479, pp. 389-392, March 4, 1904. He has also written reviews published in the "American Naturalist."

Dr. Rand has completed a rather lengthy paper on "The Behavior of the Epidermis of the Earthworm in Regeneration," which will soon be published in Roux's "Archiv für Entwicklungsmechanik," and has nearly ready for publication — in collaboration with John L. Ulrich — a paper on "The Posterior Connections of the Lateral Vein of the Skate. He also has under way further studies on Regeneration in the Earthworm.

Dr. Petrunkevitch has published "Künstliche Parthenogenese." Festschrift zum 70. Geburtstag des Herrn Geheimen Raths Prof. Dr. August Weismann in Freiburg i. B. Zool. Jahrb. Suppl. VII., 62 pp., 3 Taf.; and "Gedanken über Vererbung." Freiburg i. B., Speyer und Kaerner, 1904, 83 pp.

The Virginia Barret Gibbs Scholarship for 1903-04 was held by Mr. John H. McClellan, a graduate of the University of Michigan, and subsequently Instructor in Zoölogy in the University of Illinois.

Five persons, including one instructor, carried on work at Wood's Hole during the summer of 1904; one, at the Marine Biological Laboratory, and four, at the United States Fisheries Bureau. Of the latter, two were in the employ of the Bureau.

Professors Castle and Mark received from the Trustees of the Carnegie Institution of Washington a grant of \$500 to aid in the study of questions of heredity.

The Zoölogical Club held meetings on Wednesday afternoons throughout most of the year. The topics presented were usually announced in advance in the "Calendar." There were twenty-five meetings, at which fifty-four papers were presented, twenty-nine

of these being based on original researches. Under the auspices of the Club, a public lecture was given April 13, 1904, by Dr. Hans Gadow, of Cambridge, England, on "Southern Mexico and its Natural History."

Some of the results of the work carried on at the Bermuda Station during the summer of 1903 have already been handed in, and three papers based on this work have been printed; others are in preparation. These papers are published in various suitable journals as "Contributions from the Bermuda Biological Station for Research," and are numbered in the order of their publication. The three already published are: —

- No. 1. COLE, LEON J. — Pycnogonida collected at Bermuda in the Summer of 1903. *Proceed. Bost. Soc. Nat. Hist.*, Vol. 31, No. 8, pp. 315–328. pls. 20–22. July, 1904.
- No. 2. GULICK, ADDISON. — The Fossil Land Shells of Bermuda. *Proceed. Acad. Nat. Sci. Philadelphia*, 1904, pp. 406–425. 3 maps, and pl. 36. April [June 25], 1904.
- No. 3. BOWDITCH, HAROLD. — A List of Bermudian Birds seen during July and August, 1903. *Amer. Naturalist*, Vol. 38, No. 451–452. pp. 555–563. July–August [September], 1904.

There were fifteen persons enrolled at the Bermuda Station during the summer of 1904. Of these six were, or had been, connected with Harvard University. It was found that *Amphioxus* existed in abundance at many localities, and the much rarer *Asymmetron lucayanum* Andrews was discovered for the first time in Bermuda. Living specimens of both these Acraniota were brought to Cambridge.

The retrenchment which has been compelled by the present condition of University finances has reduced by half the amount of money appropriated by the Corporation for the expenses of the Department and for the publication in the Museum Bulletin of Contributions from the Zoölogical Laboratory. This will necessitate the publication of a greater proportion of the Contributions in other journals than has hitherto been customary.

Contributions from the Zoölogical Laboratory published between July 1, 1903, and June 30, 1904.

143. PARKER, G. H. — The Skin and the Eyes as Receptive Organs in the Reactions of Frogs to Light. *Amer. Jour. of Physiol.*, Vol. 10, No. 1, pp. 28–36. September, 1903.

144. HOWARD, A. D. — On the Structure of the Outer Segments of the Rods in the Retina of Vertebrates. *Amer. Naturalist*, Vol. 37, No. 440, pp. 541-550. September, 1903.
145. BREED, R. S. — The Changes which occur in the Muscles of a Beetle, *Thymalus marginicollis* Chevr., during Metamorphosis. *Bull. Mus. Comp. Zoöl.*, Vol. 40, No. 7, pp. 315-382. 7 pls. October, 1903.
146. CASTLE, W. E. — The Laws of Heredity of Galton and Mendel, and Some Laws Governing Race Improvement by Selection. *Proceed. Amer. Acad. Arts and Sci.*, Vol. 39, No. 8, pp. 221-242. November, 1903.
147. CARLTON, F. C. — The Color Changes in the Skin of the so-called Florida Chameleon, *Anolis carolinensis* Cuv. *Proceed. Amer. Acad. Arts and Sci.*, Vol. 39, No. 10, pp. 257-276. 1 pl. December, 1903.
148. LANDER, C. H. — The Anatomy of *Hemiurus crenatus* (Rud.) Lühe, an Appendiculate Trematode. *Bull. Mus. Comp. Zoöl.*, Vol. 45, No. 1, pp. 1-28. 4 pls. January, 1904.
149. PETERS, A. W. — Metabolism and Division in Protozoa. *Proceed. Amer. Acad. Arts and Sci.*, vol. 39, No. 20, pp. 439-516. April, 1904.
150. HALL, R. W. — The Development of the Mesonephros and the Müllerian Duct in the Amphibia. *Bull. Mus. Comp. Zoöl.*, Vol. 45, No. 2, pp. 29-125. 8 pls. June, 1904.
151. BIGELOW, H. B. — The Sense of Hearing in the Goldfish *Carassius auratus* L. *Amer. Naturalist*, Vol. 38, No. 448, pp. 275-284. April [June], 1904.

REPORT OF THE STURGIS-HOOPER PROFESSOR.

BY PROFESSOR WILLIAM M. DAVIS.

THE preparation of a report on my journey across Turkestan in the summer of 1903 as a member of Mr. Raphael Pumpelly's Carnegie Institution expedition has occupied much time during the past winter. A careful revision has been made, as far as the resources of our libraries permit, of the later Russian explorations in the Aralo-Caspian region, the plains of Turkestan, and the mountains on the south and east, essays by Mushketof, Konshin, Obruchef, and Bogdanovitch having proved especially helpful. The chief results of my own studies are as follows: The large area of the Quaternary Caspian, as recorded in the elevated shore lines at Baku on the west coast and at Krasnovodsk on the east coast, followed a prolonged period of smaller area and low water level, and was not, as the earlier observers supposed, a stage in the reduction from the still larger Pliocene Caspian. The plains of southern Turkestan present every appearance of having been aggraded by the rivers that now flow out upon them, and thus offer an interesting illustration of the condition through which the Great Plains, piedmont to the Rocky Mountains, are supposed to have passed. The Tian Shan, where my party crossed this mountain system in the neighborhood of Son-kul and Issik-kul, appeared to have been once worn down to small relief over large areas, before it was warped and raised in blocks to its present altitude and dissected to its present form: while the steppes to the east and northeast of Lake Balkash represent worn-down areas of the same ancient mountain system, not yet again lifted to great altitudes. Lectures upon the journey have been given before the Geographical Societies of New York, Philadelphia, Baltimore, and Washington, as well as before the Harvard Travellers Club, in Cambridge, and the Boston Society of Natural History and the Appalachian Mountain Club, in Boston.

Mr. Ellsworth Huntington, my associate in Turkestan, remained there after my return home, and made an interesting journey through the heart of the Tian Shan to Kashgar in the Tarim basin

of Chinese Turkestan, and thence westward to Ferghana in Russian Turkestan. His observations prove a succession of several glacial epochs, and corroborate my conclusion as to the re-elevation of the mountain ranges.

The usual courses of instruction have been given during the academic year. In the advanced course (Geology 20), special studies have been made by several graduate students on shore forms of Lake Michigan, glacial cirques in the Rocky Mountains, river meanders and cut-offs, river systems of Iowa, piedmont fluvial plains, glacial sand plains in the Sudbury Valley, Mass., the gorge of the Tennessee River at Chattanooga, and other problems. These studies have for the most part been based on field-work and extended by reading and discussion. The study of the gorge of the Tennessee River by Mr. D. W. Johnson, instructor at the Massachusetts Institute of Technology, included two weeks field-work in the Chattanooga district, with the result of demonstrating that the river has followed its present westward course below Chattanooga since early Tertiary time at least, and that there is no evidence that it ever flowed directly southwest, *via* the Coosa-Alabama, to the Gulf of Mexico. In the course on the Physiography of Europe (Geology 7), increased use has been made of graphic exercises, chiefly in the drawing of typical diagrams from large scale maps; this innovation has proved instructive and it will probably be systematically extended hereafter.

After corresponding with the Geological Departments of a number of other Universities, a plan was adopted for the preparation of a single circular in which all the field courses in Geology for the summer of 1904 should be described. The circular was issued in April as a "Joint Announcement," by Chicago, Columbia, Harvard, Johns Hopkins, and Yale, and thus placed before students in all parts of the country the various opportunities offered for summer field-work. It is hoped that this plan may be farther developed for the summer of 1905. Several friends of our Department of Geology and Geography have given us scholarships for our courses in the Rocky Mountains, and these have been awarded to graduates of Amherst and Cornell (Iowa) Colleges, now in the Harvard Graduate School, a graduate of Harvard now teaching, a senior at the Massachusetts Institute of Technology, and a student at Yale University.

As representative of the Harvard Travellers Club on the Committee of Arrangements for the Eighth International Geographic

Congress held at Washington and elsewhere in September, 1904, and as Chairman of the Committee on Scientific Program for the Congress, I have had much correspondence with European and American Geographers.

During July, I conducted a small party, including two professors of geology, on an excursion to the southern Wahsatch, the Canyon, and the House ranges of Utah; we found new evidence leading to the conclusion that these ranges are faulted blocks, now maturely carved. On the way west a short visit was made to a glaciated district in the Sawatch range of Colorado, where interesting examples of glacial sculpture were found. In September and early October, I attended the sessions of the Geographic Congress from Washington to St. Louis, taking part in the World's Congress of Science and Arts at the latter place, and then continuing on a geographical excursion to the Colorado Canyon and the City of Mexico.

The following papers have been published during the year: —

The Mountain Ranges of the Great Basin. Bull. Museum Comp. Zoöl. at Harvard College. Vol. XLII. Geol. Series, Vol. VI. 1903. pp. 127-177. 7 pls.

A Summer in Turkestan. Bull. Amer. Geogr. Soc., Vol. XXXVI. 1904. pp. 217-228.

A Flat-topped Range in the Tian Shan. Appalachia, Vol. X. 1904. pp. 277-284.

Geography in the United States: Address as chairman of Section E, American Association, Proc. Amer. Assoc., 1904; Amer. Geol., Vol. XXXIII. 1904. pp. 156-185.

As a result of work in Utah under my direction in the summer of 1902, the following essay has been published: —

E. HUNTINGTON AND J. W. GOLDTHWAIT. The Hurricane Fault in the Toquerville District, Utah. Bull. Museum Comp. Zoöl. at Harvard College. Vol. XLII. Geol. Series, Vol. VI. 1904. pp. 197-259. 7 pls.

REPORT OF THE DEPARTMENT OF GEOLOGY AND GEOGRAPHY.

BY ASSISTANT PROFESSOR ROBERT DE C. WARD.

THE following table gives the numbers of students who took the various courses in Geology and Geography which were given during the year 1903-04 in the lecture rooms and laboratories of the Museum. The numbers of students in Radcliffe College are in italics.

Two summer courses were given. The elementary course in Geology was in charge of Professor J. E. Woodman, of Dalhousie

Courses.	Students.
Geology A 1 hf	72 7
" B 2 hf	140 10
" 1 1 hf	16
" 2 2 hf	16
" 5 2 hf	124 18
" 7 2 hf	19
" 8	15
" 9 2 hf	8
" 11	6
" 14 1 hf	64
" 15	1
" 16 1 hf	4
" 19 1 hf	12
" 20	6 1
" 22	13
" 23	7
" 26	1
" 5 a 1 hf	38
Totals 18	524 74

College, Halifax, Nova Scotia, formerly an Assistant in this Department. Professor Shaler gave several lectures in this course. The number of students was 17. The summer course in Physiography, given by Mr. H. T. Burr, aided by Mr. F. M. Wilder, both former Assistants in this Department, was attended by 22 students.

There were no changes of note in the instruction given during the year 1903-04 as compared with that of the preceding year. Geology A was given by Mr. P. S. Smith, and the following acted as Assistants in the various courses named: Mr. P. S. Smith, in 4 and 8; Mr.

Walter S. Tower, in A and B; Mr. J. W. Goldthwait, Austin Teaching Fellow in Geology, in 4 and 5; Mr. William M. Gregory, in 11 and 14; Mr. J. M. Bell, in 5; Mr. R. W. Richards, in 22; and Mr. H. O. Wood, in 9 and 22. In addition, Messrs. A. K. Adams, L. O. Packard, and H. E. Simpson served as Student-

Assistants in the laboratory and field-work of Geology 5, under the direction of Professor J. B. Woodworth.

In November and December, 1903, six illustrated public lectures were given in the Geological Lecture Room, on successive Friday afternoons, at 4.30 P.M. The subjects of these lectures were as follows: I. The Natural History of the Diamond. Professor Palache. II. The Climate of the Philippines. Professor Ward. III. The Glacial Geology of Southeastern Massachusetts. Professor J. B. Woodworth. IV. Evidences for Evolution illustrated by certain Fossil Types. Professor R. T. Jackson. V. Some Geological Problems of the Yellowstone National Park. Professor Jaggar. VI. The History of Niagara. Professor Davis.

The Department acknowledges, with great satisfaction, a gift of one hundred dollars from Mr. George P. Gardner, of the Visiting Committee appointed by the Board of Overseers, this sum to be expended in building and installing cases in the new Geological Exhibition Rooms. The Department also gratefully acknowledges a gift received, through the generosity of Mr. Alexander Agassiz, from the Museum of Comparative Zoölogy, of some exhibition cases recently removed from the African Room in that Museum. With these resources, and with a slight addition from the funds of the Department, two exhibition cases have now been erected in the large exhibition room of the Geological Museum, one against the north wall, and one between the windows on the south side. Both cases are ready for the installation of materials for exhibition.

Professor Shaler gave his regular lectures during the first half-year, and left Cambridge January 2, 1904, on a leave of absence for five months. During his absence, the lectures in Geology 4 were given by Professor Jaggar, and those in Geology 14 by Professor R. T. Jackson.

Professor Davis's work is described on pages 13-15.

Professor R. T. Jackson reports that the teaching collections in Palæontology are in good condition. Some additions were made by purchase from Ward's Natural Science Establishment. A number of enlarged photographic diagrams for teaching purposes were added to the laboratory equipment.

Professor Ward reports an increase in the number of students in Elementary Meteorology (Geology B). Considerable time was devoted to rearranging and systematizing the laboratory exercises

in this course, and a number of new maps for laboratory use were added to the teaching equipment. In 1896, on the dissolution of the New England Meteorological Society, the funds remaining on hand were left in the hands of a committee of three, the Society having voted that this money should be devoted "to some meteorological purpose." After a presentation of the need of a working instrumental equipment for the use of students in Meteorology in this Department, this Committee voted to hand over to Professor Ward the sum of about one hundred dollars to be expended in the purchase of meteorological instruments. With this fund there have already been bought two nephoscopes, of the Blue Hill pattern, specially constructed by Mr. S. P. Fergusson, and a much-needed Richard thermograph and hygrograph have been ordered from Paris. With two or three hundred dollars more, it would be possible to equip a small working meteorological laboratory, which is absolutely necessary if adequate instruction in meteorology is to be given. During the year Stanislav Hanzlik, Ph.D. in Meteorology of the University of Prague, has been a graduate student in this Department. Dr. Hanzlik has devoted himself especially to a study of the climatology of the United States, and to an investigation of the movements of cyclones in the United States. A thesis prepared by him in Geology 26, on "The Geographical Distribution and Movement of Cyclones of High Velocity in the United States," is shortly to be published. Dr. Hanzlik has also given attention to the general methods of conducting the courses in Meteorology and Climatology, and to the teaching materials in these subjects. During the summer of 1904, with the cordial coöperation of Mr. William C. Lane, the meteorological and climatological books and atlases on deposit in the Geological Museum were rearranged, classified, and catalogued, so that the collection is now in excellent order.

Professor J. B. Woodworth reports that the usual courses were given by him during the year. Mr. P. S. Smith acted throughout the year as aid to Professor Woodworth in the conduct of the library and field work of the advanced course in General Geology. Among the investigations undertaken in Geology 16 (Glacial Geology), Mr. W. S. Tower made a careful search of the coasts north and south of Boston for evidences of changes of level, and Mr. C. H. Paige, in addition to local field-work, searched the New England reports for records of glacial striæ, and carefully plotted them on a map, ready for publication. Three students continued

the work of this course in the second half-year as members of Course 23. Mr. G. C. Curtis also prepared for publication a brief report on the elevated shore-lines of Monhegan Island, Maine. Instruction in the elements of Geology was given, during the first half-year, to 38 students of Radcliffe College, and in Elementary Field and Laboratory Geology to 15 Radcliffe students during the second half-year. Mr. Goldthwait assisted in the latter course, and conducted all but one of the excursions. Partly to supplement the work in Glacial Geology, and partly to make use of a large number of instructive field localities south of Boston, Professor Woodworth has arranged to give, in alternate years with Geology 16, a new half-course on the Carboniferous Period.

The rock collections in the laboratory of General Geology were increased during the year by the purchase of a set of the Oscar Rohn collection of rocks illustrating the geology of the Lake Superior district. Mr. P. S. Smith donated to the laboratory his own collection of rocks from the Black Hills of South Dakota, including specimens from the Archaean up to and through the Jurassic. The Department is also indebted to Mr. George D. Keyser for specimens of crystalline rock salt from the lake beds near Gunnison, Utah. Sixty pieces of pumice from the streets of St. Pierre, Martinique, together with one volcanic bomb from Mont Pelée, were purchased from Ward, of Rochester, for the laboratory. A Locke hand-level and a camera were added to the field equipment, and seven enlarged photographs from negatives of the New York Geological Survey were framed and placed on the walls of the Museum. An additional collection case, holding 91 standard museum trays, was erected in the hallway for storage purposes.

At the request of Professor Stanislas-Meunier, of the Museum of Natural History in Paris, Professor Woodworth sent to that institution for temporary exhibition during April, and for permanent deposit in the collections, a small exhibit representing some recent studies of trails in the Saratoga sandstone. As a member of the New York State Museum, Professor Woodworth continued his field investigations during September, 1903, in New York, over parts of Canada, from Ottawa to Belœil Mountain, Quebec, and in parts of Vermont. During the winter and spring, reports were prepared upon the Surface Geology, including the elevated shore-lines of the Mooer's quadrangle in Clinton Co., New York,

and upon the larger question of the ancient water-levels of the Hudson and Lake Champlain valleys. As contributory to the preparation of these reports, trips were made to Washington, D. C., during the mid-year period, and to certain localities in the Hudson Valley during the April recess.

Professor Jaggar reports that the advanced field course in Geology was taken by thirteen students, who completed the survey of the Metropolitan District of Boston, which was commenced in 1900, at the time when the work was first given into Professor Jaggar's hands. A large topographic map was prepared, showing the entire metropolitan district, with topography compiled from the best available sources, and on this map all of the geological records of the past five years were inscribed in color. This map will be put on exhibition beside the large Boston model in the Geological Exhibition Rooms. Messrs. R. W. Richards and H. O. Wood acted as Assistants in this course. Mr. Richards also made a large number of photographs in illustration of the field-work of the year, and Mr. Wood supervised the cataloguing and recording of all the specimens which have been collected in the metropolitan district. The year's work, therefore, has produced the following new materials: a topographical and geological map of Boston; a systematic collection of rock specimens; a collection of about one hundred photographs of Boston localities. Professor Jaggar continued his work as a teacher in the Massachusetts Institute of Technology, and one student from that institution was given a course in Experimental Geology in the Harvard laboratory in the spring of 1904. During the summer of 1903, in collaboration with Professor Palache, Professor Jaggar completed the geologic folio of the Bradshaw Mountains of Arizona, for the United States Geological Survey. In December, 1903, he spent three weeks in Searchlight, southern Nevada, making investigations for the Quartette Mining Co. of Boston. Professor Jaggar conducted a summer course in geological surveying to the Black Hills and Big Horn Mountains of South Dakota and Wyoming in the summer of 1904.

Mr. P. S. Smith conducted the course in Elementary Physiography along the same lines as in previous years, special attention being paid to the laboratory exercises. The same course was repeated for students of Radcliffe College. Mr. Smith, as previously noted, also acted as Assistant in Courses 4 and 8, and replaced Mr. J. M. Bell, who was given leave of absence on May

21, as Assistant in Course 5 during the last two weeks of the second half-year. The admission examinations in Physiography were in charge of Mr. Smith, who reports a marked increase in the number of candidates. Mr. Smith spent much time in the preparation of a thesis on the "Copper Sulphide Deposits of Orange County, Vermont," which was accepted for the degree of Ph.D. The degree was conferred in June, 1904. A summary of this thesis, prepared with the collaboration of Professor H. L. Smyth, was published in the "Engineering and Mining Journal," April, 1904. During six weeks of the summer of 1903, Mr. Smith conducted a summer course in the study of mining operations (Mining 12), and visited most of the important gold and silver mines of Colorado, as well as coal and copper properties, smelters, and concentrating plants. In February, 1904, he made a week's trip to Cape Cod, in order to study shore phenomena after a heavy storm. During the summer of 1904 Mr. Smith was engaged in a study of the surface features of the southeastern portion of Cape Cod, in connection with an investigation regarding the retreat of the ice sheet and the development of the present day topography.

The Committee on the Gardner Collection of Photographs (Professors J. B. Woodworth and Ward, and Mr. Smith) reports as follows concerning the state of the photographic material:—

State of the Gardner Collection, June 27, 1904.	Photographs.	Slides.	Negatives.
Accessions since last report	12	740	45
Catalogued since last report	4	472	0
Unidentified views	253	30	0
Duplicates	144	51	0
Broken		1	0
Condemned	0	0	0
Last accession number, June 27, 1904	5,654	4,308	
Number now in collection	5,495	4,520	1,109

The noteworthy additions during the year consist of a set of stereopticon views purchased from Professor H. W. Fairbanks, of the University of California, and of a collection of 382 slides purchased from the series of the United States Geological Survey, including views taken by Messrs. Gilbert, Walcott, Keith, Dale, Diller, Hill, Ransom, and others. This purchase was made by means of a fund generously donated to the Department for the purpose. The name of the donor is unknown to the Committee.

An assistant was employed for a time in the repair of lantern slides, and Mr. Smith continued throughout the year to give much time to the cataloguing and care of the collections.

The following publications by officers of the Department were issued during the year:—

By R. DeC. WARD.

The Climate of South America. Bull. Amer. Geogr. Soc., Vol. XXXV. 1903. 353-360.

Our Changeless Winters. Boston Transcript, February 20, 1904.

"Sensible Temperatures." Bull. Amer. Geogr. Soc., Vol. XXXVI. 1904. 129-138.

The Climates of the United States: An Outline. The Geographical Teacher, June, 1904.

Reviews and Notes in Science, Bulletin of the American Geographical Society and Journal of Geography.

By J. B. WOODWORTH.

Bibliographic Aids in Geology, Geography, Mineralogy, Petrography, Palæontology, and Meteorology (with shelf key). Printed by the University. pp. 3.

Review of the Evolution of the Earth's Structure, by T. M. Reade. Nation, 1904.

Administrative Report of Work done in New York. Embodied in Report of the State Geologist for 1901. 55th Annual Report of the New York State Museum. Albany, N. Y. 1903. pp. r9-r14.

By T. A. JAGGAR, JR.

The Initial Stages of the Spine on Pelée. Amer. Journ. Sci., Vol. XVII. 1904. p. 34.

The Eruption of Pelée, July 9, 1902. Pop. Sci. Mo., 1904. p. 219.

The Eruption of Mont Pelée, 1851. Amer. Nat., Vol. XXXVII., No. 445, p. 51.

By P. S. SMITH.

The Copper Deposits of Vermont (with H. L. Smyth). Eng. and Min. Journ., Vol. LXXVII. April 28, 1904.

REPORT ON THE MAMMALS.

BY OUTRAM BANGS.

THE year has been an uneventful one as regards accessions to the collections. Some seventy skins, mostly with skulls, have been received, for which we are indebted to A. Agassiz, G. M. Allen, O. Bangs, T. Barbour, L. J. Cole, G. F. Gaumer, G. T. Nichols, New York Zoölogical Society, E. H. Raynes, and J. E. Thayer.

I have published during the year : —

In Proceedings of the Biological Society, Washington : —

Two New Subspecies of Tropical American Tyrant Birds. Vol. XVII., pp. 113-114. 1904.

REPORT ON THE BIRDS.

BY WILLIAM BREWSTER.

THE Department of Birds has received the following additions during the current year: About one thousand bird skins, of which five hundred and eighty-four were obtained in Australia, and two hundred and fifty-six in the Hawaiian Islands, by the late M. J. Flood, the remainder being from various parts of Europe, presented by Oliver Flood, of Leominster, Massachusetts; one hundred and twelve skins, a number of alcoholic specimens, three nests, and a few eggs, collected during the past year in Yucatan for Mr. Agassiz, by L. J. Cole; fifteen skins of Yucatan birds, presented by Dr. George F. Gaumer; one hundred and seven skins and thirty-six eggs, chiefly of North American birds, presented by T. Barbour; the skin of a hybrid duck (*Anas boschas* x *Dafila acuta*) shot by Dr. John Bryant at Currituck Sound, North Carolina, that of an albino Field Sparrow taken by Louis Cabot, Esq., at Elmwood, North Carolina, sixteen eggs collected in Wyoming, by Dr. William S. Bryant, two sterna (one of *Centurus radiolatus*, the other of *Columba leucocephala*) and the dried tongue of a Honey Creeper (*Certhiola bahamensis*), all presented by H. B. Bigelow; two skins of Australian birds (*Merops ornatus* and *Pardalotus punctatus*), presented by Outram Bangs; two nests of the Cassique (*Ostinops*) from Yucatan, presented by G. B. Gordon; and the skin of an Anhinga from Yucatan, presented by E. H. Thomson. During the year upwards of four hundred birds have been loaned to specialists for study and comparison.

I have published during the year:—

In the Auk:—

Further Notes on the Philadelphia Vireo, with Description of the Nest and Eggs.

An Interesting Solitary Vireo (*Vireo solitarius*).

In Bird-Lore:—

A Tragedy in Nature.

REPORT ON THE REPTILES, BATRACHIANS, AND FISHES.

BY SAMUEL GARMAN.

THE list of accessions for these departments, like that of the donors, is of more than the usual extent for a single year. The material received is from widely distributed localities. The following is the list of those by whom these collections have been increased: Charles C. Adams, Alexander Agassiz, Henry B. Bigelow, the Boston Society of Natural History, the British Museum, Outram Bangs, Thomas Barbour, G. A. Boulenger, Owen Bryant, F. W. Carpenter, L. J. Cole, William F. Clapp, Austin C. Clark, R. L. Ditmars, R. T. Jackson, H. P. Johnson, F. T. Lewis, Seth E. Meek, George Nelson, the New York Zoölogical Society, G. H. Parker, F. W. Putnam, Captain Wirt Robinson, U. S. A., Rev. Robert K. Smith, John E. Thayer, United States Bureau of Fisheries, and W. McM. Woodworth.

The largest additions to the collections were those of the John E. Thayer Expedition, the Yucatan Expedition, the two expeditions of Thomas Barbour, and the collection sent by Charles C. Adams. These are particularly rich in insular species. An important lot of marine species was obtained by purchase, some of which were desiderata for the exhibition rooms, and all are of special value in connection with present researches. Certain forms, among them a number from the New York Zoölogical Society, have been mounted for the exhibition rooms. The catalogues have been much enlarged, and undesirable duplicates and worthless specimens have been withdrawn. Material has been exchanged with Charles C. Adams, the British Museum, the Boston Society of Natural History, F. W. Carpenter, E. L. Mark, the New York Zoölogical Society, and G. H. Parker. Dr. Parker has returned the Museum collection of Branchiostomatidæ. Except in case of gradual changes of color in alcohol, by oily specimens,

and the bleaching undergone by specimens exposed to the light, the condition of the collections, so far as preservation is concerned, has not greatly changed. The Chismopnea in the Museum collections were made the subject of a special monograph by the assistant in charge of the Department.

REPORT ON THE ENTOMOLOGICAL DEPARTMENT.

BY SAMUEL HENSHAW.

For additions to the collections the Department is indebted to Mrs. G. R. Henderson, Miss E. B. Bryant, Miss H. S. Clark, Miss C. H. Clarke, Miss F. M. Slack, and to Messrs. G. M. Allen, Outram Bangs, Thomas Barbour, Frederic Blanchard, F. C. Bowditch, William Brewster, E. S. Bryant, John Bryant, Owen Bryant, W. E. Castle, J. R. Chadwick, Walter Deane, John Dixwell, J. H. Emerton, W. G. Farlow, W. L. W. Field, W. F. Fiske, J. W. Freese, G. L. Goodale, Roland Hayward, R. H. Howe, Jr., J. G. Jack, R. T. Jackson, C. W. Johnson, H. P. Johnson, Theodore Lyman, E. L. Mark, Robert Meusel, A. P. Morse, J. G. Needham, A. S. Packard, G. H. Parker, F. H. Peabody, B. L. Robinson, Wirt Robinson, J. H. Sears, J. B. Smith, P. S. Smith, J. D. Sornborger, Roland Thaxter, E. P. Van Duzee, E. B. Williamson, and W. McM. Woodworth. From Mr. John E. Thayer, we have received some Australian Lepidoptera collected by the late M. J. Flood, and from Mr. L. J. Cole, a desirable series of all orders, one of the results of his Yucatan trip.

The R. M. Grey collection of Lepidoptera has been obtained by purchase. This material, though not yet thoroughly examined, contains many species new to the collection of the Department, and will help materially towards the completion of the series on exhibition.

A few Javan Coleoptera have been added, also by purchase.

The Annual Reports for 1874 and 1875 acknowledge the indebtedness of the Museum to Baron C. R. von Osten Sacken for his invaluable services in connection with the collections of Diptera; to these reports Baron Osten Sacken contributed statements concerning the condition of these collections, and his work upon them, a subject to which he returns in his "Record of my Life-work

in Entomology" (Cambridge, October, 1903). In this book, indispensable to all students of North American Diptera, will be found detailed notes about labels, localities, type specimens, and the various contributors to the Loew and Osten Sacken collections.

The series of fossil insects have been overhauled, and a large part of the Scudder collection incorporated with the Museum series; the latter is especially rich in species from the Jura of Europe, while the Scudder collection, practically complete for the Cenozoic fauna of North America, contains also a fair representation from the earlier formations, together with a large number of casts of forms not easily duplicated.

Portions of the R. M. Grey Lepidoptera have been worked over and incorporated with the collection, and the arrangement of one hundred new boxes, containing a part of the Arctiidæ, Lymantriidæ, Lasiocampidæ, and Noctuidæ has been revised.

REPORT ON THE CRUSTACEA AND MOLLUSCA.

BY WALTER FAXON.

THE following additions to the carcinological collections have been made during the past year :—

Paguridæ from Cohasset, Mass. Gift of Mr. Owen Bryant.

Crustacea collected in the Bermudas. Gift of Mr. Owen Bryant.

Carcinus mænas, green crab, from Kittery, Maine, illustrating the northward dispersal of this species in recent years. Gift of Owen Bryant.

Crustacea from Progreso, Yucatan, collected by Leon J. Cole.

A few Crustacea from the Pearl Islands, Panama, collected in February-March, 1904, by W. W. Brown, Jr. Gift of Mr. John E. Thayer.

Fifty-six bottles of Crustacea from the Bermudas. Gift of the Zoölogical Department of Harvard College.

Three specimens of *Anoplodactylus lentus* Wils., from Wood's Hole, Mass. Gift of Mr. H. P. Johnson.

Material has been loaned for study to M. H. Coutière, Paris, and four species (five specimens) have been presented to the United States National Museum.

Donations to the Mollusk collections have been credited to Mr. Outram Bangs, J. H. Blake, O. Bryant, L. J. Cole, H. P. Johnson, and United States Steamship "Albatross."

REPORT ON THE DEPARTMENT OF VERTEBRATE PALÆONTOLOGY.

BY CHARLES R. EASTMAN.

SINCE returning from abroad in December, 1903, the time of the Assistant has been devoted principally to the investigation of newly acquired material, and to the general care of the collection, including the selection and cataloguing of an appropriate series of Mesozoic and Tertiary vertebrates to be placed on exhibition. The novel manner of displaying slabs containing fossil fishes, which owes its inception to Dr. Woodworth, marks a distinct improvement in installation methods as usually applied to this class of vertebrate remains. Our present poverty in fossil mammals has made it necessary to introduce an undesirable abundance of plaster casts; but these may be expected to become replaced by original specimens as rapidly as possible. Accessions of unusual value have been made to the collection of fossil fishes during the year, as will be apparent from the partial list given below.

Additions to the Collection during the Year.

1903. Krantz Collection. An important suite of excellently preserved Eocene fishes from Monte Bolca, near Verona, Italy, containing several types and figured specimens. Purchased. Received December 24.

1904. An historic specimen from the same locality as the above, formerly belonging to the Gazola Collection of the Paris Museum, subsequently obtained by Professor J. E. Wolff, and presented to the Museum by Professor R. T. Jackson. Received March 17.

1904. Casts of finely preserved specimens of *Semionotus agassizii* from the Connecticut Valley Trias, received in exchange with the American Museum of Natural History.

1904. A small collection of fossil fishes from a newly discovered fish-bearing horizon in the Colorado Devonian, presented by Drs. Whitman Cross and T. W. Stanton of the United States Geological Survey. Received March 18.

1904. A specimen of *Semionotus* from the Trias of Turner's Falls, Mass., presented by Mr. E. P. Ball, C.E. Received March 30.

1904. A small collection of Carboniferous fishes from Horton's Bluff, Nova Scotia, collected and presented by Professor A. S. Packard. Received May 26.

Papers published during the Year.

A Peculiar Modification amongst Permian Dipnoans. *Amer. Nat.*, Vol. XXXVII. pp. 493-495.

Correspondence: [On Alleged Appendages of the Tremataspidae]. *Ibid.*, pp. 573-577.

Palæozoic Fishes (*pars*). Leconte's Elements of Geology, 5th ed. New York, 1903.

On the Nature of Edestus and Related Forms. Mark Anniversary Volume, Art. XIV., pp. 279-289.

On Old Collections and Early Studies of Eocene Fishes. Abstract in Science, n. s., Vol. XIX. p. 253.

Recent Zoöpalæontology. *Ibid.*, pp. 396-397.

Marginal and Ridge-scales in Cephalaspis and Drepanaspis. *Ibid.*, pp. 703-704.

On the Dentition of Rhynchodus and other Fossil Fishes. *Amer. Nat.*, Vol. XXXVIII. pp. 295-299.

Descriptions of Bolca Fishes. Bull. Mus. Comp. Zoöl., Vol. XLVI. No. 1, pp. 1-36. 2 pls.

Geo-Biological Terms. Science, n. s., Vol. XX. p. 51.

Kindergarten Science. *Ibid.*, pp. 85-86.

REPORT ON THE LIBRARY.

BY SAMUEL HENSHAW.

DURING the year from August 1, 1903, to July 31, 1904, 1,982 volumes, 1,914 parts of volumes, 1,607 pamphlets, and 85 maps have been added to the Library.

The total number of volumes in the Library is 40,064, the total number of pamphlets is 33,330.

One thousand, one hundred and forty-two volumes have been bound; sixteen hundred pamphlets have been separately bound.

To Messrs. William Brewster, Louis Cabot, Arthur F. Estabrook, Augustus Hemenway, Francis H. Peabody, Dudley L. Pickman, John E. Thayer, and another, the Museum is indebted for a copy of volumes one and two of Audubon's "Birds of America" (Elephant folio). This is an accession of considerable importance and value; the plates, two hundred in number, are early impressions of great brilliancy and are in a remarkable state of preservation; the legends are of much bibliographic interest.

Another work, or part of a contemplated book, from the library of Louis Agassiz is worthy of a brief note; it is pages i-lxiv of a general work on snakes by Johannes Wagler, and bears the following dedication in pencil: "Prof. Dr. Agassiz mit besten Grüßer von Dr. V. Martius." According to Dr. Leohnard Stejneger, of the United States National Museum, who has kindly given me the facts concerning this unique copy, the work was "probably printed shortly after 1824." Owing to adverse criticism, the printing was discontinued, and the work suppressed so successfully, Dr. Stejneger writes, "that Wagler never afterwards used any of the new names and never referred to the work again. Your copy is probably the only one which got out."

[A]

PUBLICATIONS

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

FOR THE ACADEMIC YEAR 1903-1904.

Bulletin: —

Vol. XXXIX.

No. 8. Some Fishes from Australasia. By SAMUEL GARMAN. pp. 15. 5 Plates. August, 1903.

No. 9. Medusæ from the Maldivé Islands. By HENRY B. BIGELOW. pp. 27. 9 Plates. April, 1904.

Vol. XL.

No. 7. Contributions from the Zoölogical Laboratory. No. 145. The Changes which occur in the Muscles of a Beetle, *Thymalus marginicollis* Chevr., during Metamorphosis. By ROBERT S. BREED. pp. 68. 7 Plates. October, 1903.

Vol. XLI.

No. 2. The Chimæroids (*Chismopnea* Raf., 1815 : *Holocephala* Müll., 1834), especially *Rhinochimæra* and its Allies. By SAMUEL GARMAN. pp. 30. 15 Plates. March, 1904.

Vol. XLII.

No. 3. The Mountain Ranges of the Great Basin. By W. M. DAVIS. pp. 51. 7 Plates. September, 1903.

No. 4. Postglacial and Interglacial (?) Changes of Level at Cape Ann, Massachusetts. By R. S. TARR. With a note on the elevated Beaches. By J. B. WOODWORTH. pp. 18. 13 Plates. September, 1903.

No. 5. The Hurricane Fault in the Toqueville District, Utah. By Ellsworth Huntington and James Walter Goldthwait. pp. 63. 7 Plates. February, 1904.

Vol. XLIII.

No. 1. Reports on the Dredging Operations off the West Coast of Central America to the Galapagos, to the West Coast of Mexico, and in the Gulf of California, in Charge of Alexander Agassiz, carried on by the U. S. Fish Commission Steamer "Albatross," during 1891, Lieut. Commander Z. L. Tanner, U. S. N., Commanding. XXIX. Reports on the Scientific Results of the Expedition to the Tropical Pacific, 1899-1900. VI. Reports on the Cephalopoda. By WILLIAM E. HOYLE. pp. 71. 12 Plates. March, 1904.

Vol. XLIV.

The Stone Reefs of Brazil, their Geological and Geographical Relations, with a Chapter on the Coral Reefs. By JOHN CASPER BRANNER. pp. 285. 91 Plates. May, 1904.

Vol. XLV.

No. 1. Contributions from the Zoölogical Laboratory. No. 148. The Anatomy of *Hemiurus crenatus* (Rud.) Lühe, an appendiculate Trematode. By CLARENCE H. LANDER. pp. 28. 4 Plates. January, 1904.

No. 2. Contributions from the Zoölogical Laboratory. No. 150. The Development of the Mesonephros and the Müllerian Ducts in Amphibia. By ROBERT W. HALL. pp. 97. 8 Plates. June, 1904.

No. 3. Contributions from the Zoölogical Laboratory. No. 153. The Optic Reflex Apparatus of Vertebrates for Short-circuit Transmission of Motor Reflexes through Reissner's Fibre; its Morphology, Ontogeny, Phylogeny, and Function. — Part I. The Fish-like Vertebrates. By PORTER EDWARD SARGENT. pp. 132. 11 Plates. July, 1904.

Vol. XLVI.

No. 1. Descriptions of Bolca Fishes. By C. R. EASTMAN. pp. 36. 2 Plates. June, 1904.

Memoirs:—

Vol. XXIX.

The Coral Reefs of the Maldives. By ALEXANDER AGASSIZ. 25, 168 pp. 82 Plates. December, 1903.

Vol. XXX.

No. 1. Reports on an Exploration off the West Coasts of Mexico, Central and South America, and off the Galapagos Islands, in Charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," during 1891, Lieut. Commander Z. L. Tanner, U. S. N., Commanding. XXX. The Sponges. By H. V. WILSON. pp. 164. 26 Plates. July, 1904.

Report:—

1902-1903. pp. 35. December, 1903.

[B]

INVESTED FUNDS OF THE MUSEUM.

IN THE HANDS OF THE TREASURER OF HARVARD COLLEGE, SEPT. 1, 1901.

Sturgis-Hooper Fund	\$100,000.00
Gray Fund	50,000.00
Agassiz Memorial Fund	297,933.10
Teachers and Pupils Fund	7,594.01
Permanent Fund	117,469.34
Humboldt Fund	7,740.66
Virginia Barret Gibbs Fund	5,000.00
Willard Peele Hunnewell Memorial Fund	5,000.00
	<hr/>
	\$590,737.11

The payments on account of the Museum are made by the Bursar of Harvard College, on vouchers approved by the Keeper. The accounts are annually examined by a committee of the Overseers. The only funds the income of which is restricted, the Gray and the Humboldt Funds, are annually charged in an analysis of the accounts, with vouchers to the payment of which the income is applicable.

The income of the Gray Fund can be applied to the purchase and maintenance of collections, but not for salaries.

The income of the Virginia Barret Gibbs Scholarship Fund, of the value of \$250, is assigned annually with the approval of the Faculty of the Museum, on the recommendation of the Professor of Zoölogy and of Comparative Anatomy in Harvard University, "in supporting or assisting to support one or more students who have shown decided talents in Zoölogy, and preferably in the direction of Marine Zoölogy."

The income of the Humboldt Fund (about \$300) can be applied for the benefit of one or more students of Natural History, either at the Museum, the United States Fish Commission Station at Wood's Hole, Bermuda, or the Tortugas.

Applications for the tables reserved for advanced students at the Wood's Hole Station should be made to the Faculty of the Museum before the 1st of May. Applicants should state their qualifications, and indicate the course of study they intend to pursue.

[C]

BOSTON SOCIETY OF NATURAL HISTORY,
BERKELEY STREET, BOSTON, MASS., OCT. 23, 1903.

DEAR SIR, — At a meeting of the Council on October 21st, it was voted that the authorities of the Museum of Comparative Zoölogy be allowed to extend the use of the Humboldt Fund to students at the Bermudas or the Tortugas.

Yours very truly,

GLOVER M. ALLEN,

MR. ALEXANDER AGASSIZ, Cambridge, Mass.

Secy.

The following Publications of the Museum of Comparative Zoölogy
are in preparation:—

Reports on the Results of Dredging Operations in 1877, 1878, 1879, and 1880, in charge of ALEX-
ANDER AGASSIZ, by the U. S. Coast Survey Steamer "Blake," as follows:—

- E. EHLERS. The Annelids of the "Blake."
C. HARTLAUB. The Comatulæ of the "Blake," with 15 Plates.
H. LUDWIG. The Genus *Pentacrinus*.
A. MILNE EDWARDS and E. L. BOUVIER. The Crustacea of the "Blake."
A. E. VERRILL. The Alcyonaria of the "Blake."

Reports on the Scientific Results of the Expedition to the Tropical Pacific, in charge of
ALEXANDER AGASSIZ, on the U. S. Fish Commission Steamer "Albatross," from August,
1899, to March, 1900, Commander Jefferson F. Moser, U. S. N., Commanding.

- LOUIS CABOT. Immature State of the Odonata, Part IV.
E. L. MARK. Studies on *Lepidosteus*, continued.
" On *Arachnaetis*.
R. T. HILL. On the Geology of the Windward Islands.
W. McM. WOODWORTH. On the Bololo or Palolo of Fiji and Samoa.
AGASSIZ and WHITMAN. Pelagic Fishes. Part II., with 14 Plates.

Reports on the Results of the Expedition of 1891 of the U. S. Fish Commission Steamer
"Albatross," Lieutenant Commander Z. L. TANNER, U. S. N., Commanding, in charge of
ALEXANDER AGASSIZ, as follows:—

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| A. AGASSIZ. The Pelagic Fauna. | H. LUDWIG. The Starfishes. |
| " The Echini. | J. P. McMURRICH. The Actinarians. |
| " The Panamic Deep-Sea Fauna. | E. L. MARK. Branchiocerianthus. |
| K. BRANDT. The Sagittæ. | JOHN MURRAY. The Bottom Specimens. |
| " The Thalassicolæ. | P. SCHIEMENZ. The Pteropods and Hete-
ropods. |
| C. CHUN. The Siphonophores. | THEO. STUDER. The Alcyonarians. |
| " The Eyes of Deep-Sea Crustacea. | M. P. A. TRAUSTEDT. The Salpidæ and
Doliolidæ. |
| W. H. DALL. The Mollusks. | H. B. WARD. The Sipunculids. |
| H. J. HANSEN. The Cirripeds. | W. McM. WOODWORTH. The Nemerteans. |
| W. A. HERDMAN. The Ascidians. | " The Annelids. |
| S. J. HICKSON. The Antipathids. | |
| C. A. KOFOID. <i>Solenogaster</i> . | |
| R. VON LENDENFELD. The Phospho-
rescent Organs of Fishes. | |

PUBLICATIONS
OF THE
MUSEUM OF COMPARATIVE ZOÖLOGY
AT HARVARD COLLEGE.

There have been published of the BULLETIN Vols. I. to XLI., and also Vol. XLIV.; of the Memoirs, Vols. I. to XXIV., and also Vols. XXVIII. and XXIX.

Vols. XLII., XLIII., XLV., XLVI., and XLVII. of the BULLETIN, and Vols. XXV., XXVI., XXVII., XXX., XXXI., and XXXII. of the MEMOIRS, are now in course of publication.

The BULLETIN and MEMOIRS are devoted to the publication of original work by the Professors and Assistants of the Museum, of investigations carried on by students and others in the different Laboratories of Natural History, and of work by specialists based upon the Museum Collections and Explorations.

The following publications are in preparation:—

Reports on the Results of Dredging Operations from 1877 to 1880, in charge of Alexander Agassiz, by the U. S. Coast Survey Steamer "Blake," Lieut. Commander C. D. Sigsbee, U. S. N., and Commander J. R. Bartlett, U. S. N., Commanding.

Reports on the Results of the Expedition of 1891 of the U. S. Fish Commission Steamer "Albatross," Lieut. Commander Z. L. Tanner, U. S. N., Commanding, in charge of Alexander Agassiz.

Reports on the Scientific Results of the Expedition to the Tropical Pacific, in charge of Alexander Agassiz, on the U. S. Fish Commission Steamer "Albatross," from August, 1899, to March, 1900, Commander Jefferson F. Moser, U. S. N., Commanding.

Contributions from the Zoological Laboratory, Professor E. L. Mark, Director.

Contributions from the Geological Laboratory, in charge of Professor N. S. Shaler.

These publications are issued in numbers at irregular intervals; one volume of the Bulletin (8vo) and half a volume of the Memoirs (4to) usually appear annually. Each number of the Bulletin and of the Memoirs is sold separately. A price list of the publications of the Museum will be sent on application to the Librarian of the Museum of Comparative Zoölogy, Cambridge, Mass.

